

REMARKS

Claims 71-75 are pending in this application, of which Claim 71 is in independent form, and has been amended to define still more clearly what Applicants regard as their invention. Claims 61-70 have been cancelled without prejudice or disclaimer of subject matter, and will not be mentioned further. Favorable reconsideration is respectfully requested.

In the outstanding Office Action, Claims 71-75 were rejected under 35 U.S.C. § 103(a) as being obvious from U.S. Patent 6,195,077 (Gyouten), U.S. Patent 5,867,593 (Fukuda) and U.S. Patent 5,654,607 (Yamaguchi).

An object of the present invention is to reduce or eliminate distortion that occurs when modulation signals to be supplied to display devices (e.g., for individual pixels) adjacent to each other in the row direction have different pulse widths, and more specifically, to suppress the common effect that the luminance of those modulation signals which have longer pulse widths deviates from a desired value.

Independent Claim 71 is directed to a display apparatus that comprises a plurality of column wirings each connected to a respective display device, at least one row wiring, connected to the display devices, and a respective pulse width modulator ("PWM") provided for each column wiring. The PWMs are for outputting, for each column wiring, a modulation signal, and the modulation signal is corrected such as to inhibit an effect in which the waveform of the modulation signal is deformed (in terms of the luminance it represents) as a result of a level change of the modulation signal supplied to the adjacent column wiring.

By virtue of this, it is possible to suppress cross-talk that would otherwise be generated by the combination (displaying state along one line) of the luminances of the various display devices (pixels) arranged in the column direction.

Applicants have again carefully studied the Office Action and the prior art, but find themselves entirely unable to agree with the propriety of the rejection. To begin with, Applicants are forced to conclude from a thorough study of *Fukuda* that that patent contains little or no disclosure relevant in any way to the present invention. Moreover, there is simply no visible motivation for one skilled in the art to combine either *Fukuda* or *Yamaguchi* with *Gyouten* in the manner proposed in the Office Action. The motivations proposed in the Office Action are, in Applicants' view, completely unrealistic.

Gyouten, as has been thoroughly discussed in previous papers, relates to a method and device for driving a liquid crystal display (LCD) apparatus. A segment side drive circuit supplies display data in parallel to common electrodes selected by the common side drive circuit on the liquid crystal panel. A controller supplies the segment side drive circuit with a correction clock which changes the pulse width according to the display position. The correction changes the level of an output voltage output by the segment side drive circuit to an intermediate level, the amount of the correction being adjusted according to the distance, in order to even out the effective voltage values of the various display positions.

Thus, in the *Gyouten* LCD apparatus, voltage levels to be applied to respective pixels, and the durations of those levels, are varied for each pixel according to positions of the pixels. Nothing has been found, or pointed out, in *Gyouten* that has to do

with any other kind of correction, nor has anything been found in that patent, or pointed out by the Examiner, that would even hint at the *Gyouten* technique being applicable in any way to other types of systems. Importantly, in the *Gyouten* system, the correction pulse is determined entirely by the pixel position, and is *not* adjusted according to anything else. In particular, the pulse modulators in a particular column in *Gyouten* do not receive as an input a luminance signal (or modulation signal) from an adjacent column. The *Gyouten* apparatus can correct for (eliminate) nonuniformity in luminance due to differences in pixel position, but cannot correct for nonuniformity in luminance due to cross-talk with signals on an adjacent line, as is achieved with an apparatus according to Claim 71.

Fukuda, in contrast to the apparatus of Claim 71, relates to an image region dividing circuit discriminating character portions, picture portions, etc., within an image region. It should be noted the horizontal difference detector 9 shown in Fig. 1 is not connected to, and does not cooperate with, any modulator that outputs a modulation signal to a column wiring. Rather, a result of the detection performed by circuit 9 is used in correcting the luminance value. The correction made to the luminance value of each pixel by circuit 14, however, consists in removing steep edge portions. As is discussed in detail at col. 6, line 59, through col. 7, line 39, a bit map is defined in which steep edge portions are set to a value of 0, and all other portions, to a value of 1 (col. 7, lines 16-21), such a bit map being done for both the horizontal and the vertical directions. The two bit maps are ORed together to produce a mask pattern (col. 7, lines 19-21). In addition, a plane is calculated based on the gradients of the image data at the pixel, but with the steep edge portions removed, and a normal to the plane is calculated (col. 7, lines 3-14). This normal

vector and the mask pattern are provided to the luminance level correction processing unit 14 (col. 7, lines 27-33). The actual correction is effected by multiplying the monochrome luminance data by the mask pattern. The Examiner's attention is particularly directed to the *purpose* of this correction, which Applicants believe is very important to the validity of the outstanding rejection:

"In the luminance level correction processing executed by the luminance level correction processing unit 14, luminance level image data from the monochrome image converter 8 is multiplied with the mask pattern calculated in advance *to remove luminance data of steep edge portions* [emphasis added]."

That is, the processing relied upon by the Examiner as relating to luminance value correction, is performed, not to compensate for distortion arising from cross-talk (or any other kind of distortion or deformation of data), but *simply to remove steep edges*. This has, in fact, nothing whatsoever to do with the correction processing performed in the *Gyouten* device, either in nature or in purpose, and in fact, it is believed to be clear that a person of ordinary skill would see absolutely no motivation whatever to modify the *Gyouten* device in any fashion, based on anything taught by *Fukuda*.

Moreover, Applicants respectfully point out that even if one or ordinary skill were somehow motivated to try and modify the *Gyouten* device based on the portions of *Fukuda* relied on by the Examiner (and applicants repeat that no such motivation has been found by Applicants, or in fact provided by the Examiner), the result would merely be an LCD device in which two types of correction were both performed, entirely independently of each other, and having nothing whatever to do with each other: (1) a correction to compensate for distortion in the outputs of the LCD device due to location of the respective

pixels, as is performed by the *Gyouten* device without modification, and (2) processing like that of *Fukuda* to remove steep edge portions from the image data. The Office Action offers, as supposed motivation for combining these two patents:

“it would have been obvious to one having skill in the art at the time the invention was made to modify *Gyouten*’s liquid crystal display panel to include *Fukuda*’s luminance correction technique including horizontal different detector. One would have been motivated in view of the suggestion in *Fukuda* that the luminance level correction process including the horizontal difference level is functionally equivalent to the desired adjustment based on the difference between luminance levels of adjacent pixels. The use of luminance level correction processing unit helps function a display system with image forming technique as taught by *Fukuda* [emphasis added].”

It cannot be stressed too strongly that in fact there is no such suggestion in *Fukuda*. The level adjustment performed in *Gyouten*’s LCD device is necessary to compensate for -- i.e., to eliminate the effects of -- differences in output of pixels that are in different locations; in contrast, the purpose of the correction processing in the *Fukuda* device is to eliminate a particular visual effect from the image data, viz., to remove steep edges. Applicants can find nothing in either type of processing that would conceivably suggest to one of ordinary skill that there was any equivalence between the two types of processing, or that would provide even a hint to that effect -- not least, because in fact they are not equivalent.

To begin with, therefore, the outstanding rejection is based on an unmotivated combination, in that one of ordinary skill would in fact have had no conceivable motivation to combine *Fukuda* with *Gyouten*. Accordingly, the rejection is improper and should be withdrawn for this reason.

The Office Action relies on *Yamaguchi* as teaching PWM, and asserts that that patent shows luminance represented by waveform amplitude, and that the amplitude is modified by being combined with the output of oscillators (to produce the pulse-width modulation), and that this somehow meets the recitation of the claims referring to deformation of a modulation signal due to a modulation signal on a neighboring line. The Examiner is mistaken as to this latter point, since the amplitude modifications produced in the *Yamaguchi* device on which he relies, are in fact *not* produced by a signal on a neighboring line, but by the combining of the signal being deformed with the output of a corresponding one of the oscillators.

Moreover, even assuming there were otherwise proper motivation to combine *Yamaguchi* with *Gyouten*, the result would be an LCD that used PWM to produce its driving signals, and there would still be neither any suggestion of the type of cross-talk that is solved by the structure recited in Claim 71, nor any suggestion as to how to reduce or eliminate such cross-talk. For the reasons given above, moreover, *Fukuda* and *Gyouten* cannot properly be combined. Even if the reliance on *Yamaguchi* were otherwise entirely proper, therefore, the rejection would still be improper, and should be withdrawn.

For all these reasons, Applicants deem that Claim 71 is allowable over the art cited against it, and request withdrawal of the rejection of that claim.

A review of the other art of record has failed to reveal anything which, in Applicants' opinion, would remedy the deficiencies of the art discussed above, as references against the independent claims herein. Those claims are therefore believed patentable over the art of record.

The other claims in this application are each dependent from Claim 71, and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

This Amendment After Final Action is believed clearly to place this application in condition for allowance and its entry is therefore believed proper under 37 C.F.R. § 1.116. (At the very least, cancellation of Claims 61-70 eliminates all issues relating to those claims.) In any event, however, entry of this Amendment After Final Action, as an earnest effort to advance prosecution and reduce the number of issues, is respectfully requested. Should the Examiner believe that issues remain outstanding, the Examiner is respectfully requested to contact Applicants' undersigned attorney in an effort to resolve such issues and advance the case to issue.

In view of the foregoing amendments and remarks, Applicants respectfully request favorable reconsideration and early passage to issue of the present application.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,


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